

## (12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization  
International Bureau



(43) International Publication Date  
1 March 2001 (01.03.2001)

PCT

(10) International Publication Number  
WO 01/14825 A1

(51) International Patent Classification<sup>7</sup>: G01B 9/02,  
G01H 9/00, 13/00, G01N 29/12

[US/US]; 619 Hudson Street, Hoboken, NJ 07030 (US).  
SEDUNOV, Nikolay [—/US]; Apartment 51, 730 Hud-  
son Street, Hoboken, NJ 07030 (US). WHITTAKER, Ed-  
ward, A. [—/US]; 204 Garden Street, Hoboken, NJ 07030  
(US).

(21) International Application Number: PCT/US00/23057

(22) International Filing Date: 23 August 2000 (23.08.2000)

(74) Agent: FRISCIA, Michael, R.; Wolff & Samson, 5  
Becker Farm Road, Roseland, NJ 07068-1776 (US).

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:  
60/150,224 23 August 1999 (23.08.1999) US

(81) Designated States (*national*): AE, AG, AL, AM, AT, AU,  
AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ,  
DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR,  
HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR,  
LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ,  
NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM,  
TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.

(71) Applicant (*for all designated States except US*): THE  
TRUSTEES OF THE STEVENS INSTITUTE OF  
TECHNOLOGY [US/US]; Castle Point on Hudson,  
Hoboken, NJ 07030 (US).

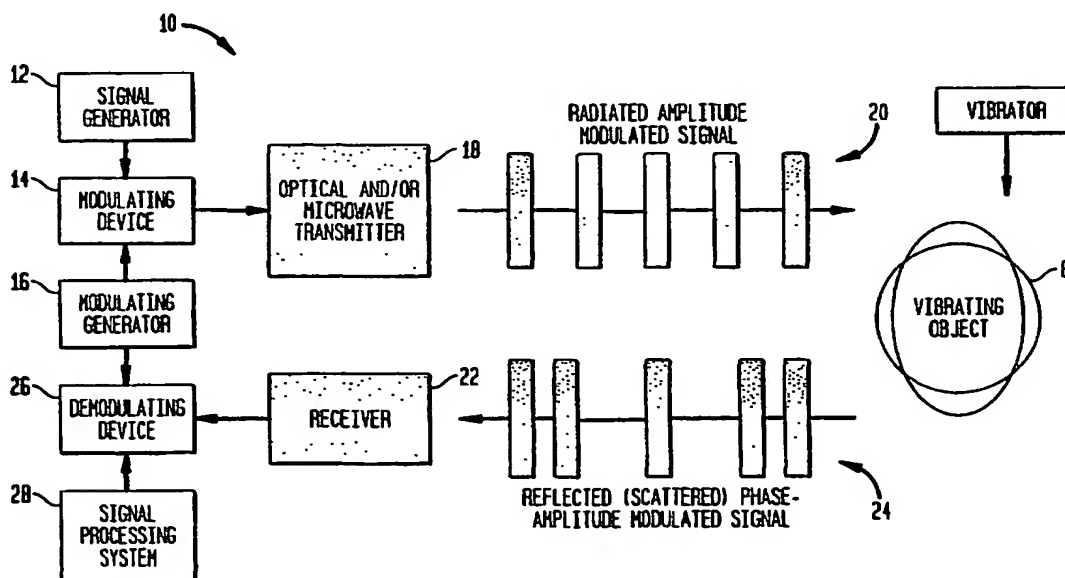
(84) Designated States (*regional*): ARIPO patent (GH, GM,  
KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian  
patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European  
patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE,  
IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG,  
CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

(72) Inventors; and

(75) Inventors/Applicants (*for US only*): DONSKOY, Dimitri

[Continued on next page]

(54) Title: METHOD AND APPARATUS FOR REMOTE MEASUREMENT OF VIBRATION AND PROPERTIES OF OBJECTS



(57) Abstract: A method and apparatus (10) is provided which employs phase or amplitude modulated electromagnetic probing waves (20) (in optical or microwave frequency ranges or both) emitted toward a vibrating object (8). The optical and/or microwave probing signals (20) remotely irradiate an object (8) of interest. The object (8) reflects and/or scatters the probing wave (20) toward a receiver (22). The reflected/scattered modulated signal (24) is received with a remote sensor (receiver) (22). Vibration causes additional phase modulation to the probing wave (20). At the receiving end, the signal is demodulated to extract and analyze the vibration waveform (26, 28). The present invention can be utilized for nondestructive testing, monitoring of technological processes, structural integrity, noise and vibration control, mine detection, etc.